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ABSTRACT

This paper discusses the quantitative and qualitative aspects of the relationship between cognitive abilities and behavioral competencies in elderly institutional residents. The former was assessed by an array of five cognitive measures: two Piagetian tasks, Set Test, WAIS Vocabulary and Digit Span subtests, and the WMS Associate Learning subtest; the latter was assessed by the Stockton Geriatric Rating Scale (SGRS). The overall variance in common between the two sets of variables was approximately 70%. Of the cognitive tasks, those most highly predictive of behavioral competencies were the Piagetian tasks, Set Test and, to a lesser extent, WAIS Vocabulary subtest. Of the four SGRS factors, the one predicted to the greatest extent was apathy, with physical disability to a lesser extent. Since the strong relationship between apathy and cognitive abilities was obtained from an institutionalized sample, future research should try to discover whether such a relationship pertains only to the institutionalized setting or applies generally across the aged population. (Author/PFS)

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COGNITIVE TASKS AS PREDICTORS OF BEHAVIORAL COMPETENCES IN THE AGED[1]

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ABSTRACT

The questions under consideration concern quantitative and qualitative aspects of the relationship between cognitive abilities and behavioral competences in the elderly institution residents. The former was assessed by an array of five cognitive measures, namely, two Piagetian tasks, Set Test, WAIS Vocabulary and Digit Span subtests and the WMS Associate Learning subtest and the latter by the Stockton Geriatric Rating Scale (SGRS).

The overall variance in common between the two sets of variables was approximately 70 percent. Of the cognitive tasks, those most highly predictive of behavioral competences were the Piagetian tasks, Set Test and, to a lesser extent, WAIS Vocabulary subtest. Of the four SGRS factors, that predicted to the greatest extent was apathy, with physical disability to a lesser extent.

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INTRODUCTION

Psychologists have invested considerable effort in the attempt to measure various aspects of cognitive ability. In general, cognitive skills can be expected to mediate the acquisition and probably the maintenance of life skills, or behavioral competences. The degree of relationship between the two sets of variables presumably will be affected by the homogeneity of the subject sample, as well as by factors relating to the measuring instruments utilized.

With regard to the elderly, the relationship between health and cognition (Kahn, Goldfarb, Pollack, & Gerber, 1960) and cognitive performance as pertaining to the normal - dementia dichotomy (Ajuriaguerra & Tissot, 1968; Inglis, 1957, 1958, 1959; Kendrick, 1972; Kendrick, Parboosingh, & Post, 1965) have received some attention. However, little or no work has been directed towards an examination of the relationship between cognitive and behavioral competences outside of the strictly clinical paradigm. It is to this end that the present research was directed.

Level of cognitive performance achieved might be expected to vary with the task employed. For the purpose of task selection, three basic criteria were proposed:

1) High reliability with the sample population;
2) Simple and concrete task instructions;
3) Brevity, so as not to tax the persistence or cooperation of the older participant.

Tasks in common usage, for assessment of the elderly, which meet all three criteria are: a) WAIS Vocabulary subtest (Wechsler, 1955, 1958);

b) WAIS Digit Span subtest (Wechsler, 1955, 1958); c) the Set Test (Isaacs & Akhtar, 1972; Isaacs & Kennie, 1973), which attempts to measure word fluency; and d) WMS Associate Learning subtest (Wechsler, 1945). In addition, there is a growing body of evidence to suggest that Piagetian tasks might provide a sensitive indicator of cognitive level (Storck, Looft, & Hooper, 1972; Sanders, Laurendeau & Bergeron, 1966). For example, Papalia, True, and Salverson (1972) reported that aged persons tend to "regress" with age to less advanced thinking processes on Piagetian tasks. Piaget (1972) also has found similar "regression" from "formal" to "concrete" operations. On the other hand, there is no evidence to indicate that behavioral competence is related to Piagetian task performance among the elderly. Two Piagetian tasks (Inhelder & Piaget, 1958) of particular interest are "The Oscillation of a Pendulum and the Operations of Exclusion" and "Equilibrium in Balance". Both tasks are useful in that they potentially discriminate among all four stages of Piagetian cognitive development.

For the measurement of behavioral competence, as relating to the institutionalized elderly, the most thoroughly researched instrument is the Stockton Geriatric Rating Scale (SGRS; Meer & Baker, 1966). Two independent factor analyses yielded four stable factors which, although intercorrelated, assess somewhat different facets of elderly patients' daily behavior in an institutionalized setting. The four factors are: a) physical disability (PD); b) apathy (AP); c) communication failure (CF); and d) socially irritating behavior (SIB). Further research on the SGRS is provided by King and Krag (1967) and Taylor and Bloom (1974). In a recent review and evaluation of various behavior rating scales, the SGRS was accredited as the most promising of the existing scales (Salzman, Shader, Kochansky, & Cronin, 1972).

The specific aims of the present study were to ascertain the overall degree of relationship between cognitive abilities and behavioral competences, as measured by the aforementioned techniques, and to provide information relevant to the qualitative aspects of this relationship, i.e., which of the cognitive tasks predict which of the SGRS factors. For purpose of analysis, the SGRS was designated as the predicted variable and the cognitive tasks as the predictor variables. Statistical procedures employed were multiple regression and canonical correlation and the samples were taken from an institutionalized population.

METHOD

Sample Population

The geriatric sample population consisted of 40 aged participants (age range = 60 - 104 yrs.; $\bar{X}$ age = 83.0 yrs.) from two homes for senior citizens. All participants were screened to exclude:

1) any physical disabilities which were not direct consequences of an ongoing brain pathology (Organic Brain Syndrome);
2) any gross auditory, visual, and tactile impairment; and
3) any who were not willing to fully cooperate with the examiner for complete assessment.

Procedure

Each individual participant was evaluated on the SGRS by two independent ward nurses who were quite familiar with them.

Each individual was administered, in a random order, the two Piagetian tasks (The Oscillation of a Pendulum and the Operations of Exclusion, and

Equilibruim in Balance). The reason for administering the two Piagetian tasks prior to any of the other cognitive tasks was to secure the participants' interest in taking part in the assessment procedures. This was done since the former tasks were found to be the most enjoyable and least threatening and consequently reduced the possibility of the session being terminated before assessment was complete. The participants were encouraged at all times to perform at their maximum level. Responses were recorded on a Sony portable tapecorder (model TC-110 B) and later rated by three judges (one of whom was J. Cyr) who were provided with specific scoring criteria. Each participant was then administered, in a random order, the following remaining tasks: Set Test, WAIS Vocabulary and Digit Span subtests, and the WMS Associate Learning subtest.

RESULTS

The interrater reliabilities for the three judges on the two Piagetian tasks ranged from .86 to .94. The intertask comparability across the two Piagetian tasks was satisfactory ($r = .87$, $p < .05$).

The interrater reliability on the predicted variable, SGRS, was .88. The four factors of the SGRS, namely, AP, PD, SIB, and CF, yielded interrater reliabilities of .93, .92, .66, and .66, respectively. These values are somewhat comparable to those reported by Meer and Baker (1966).

The pairwise correlations (r) between the predicted and predictor variables as well as the beta weight for each predictor variable as derived from multiple regression, are presented in TABLE 1. The full regression model accounted for approximately 70% of the variance (F (7, 32) = 11.09, $p < .001$). It is apparent from TABLE 1 that the more accurate predictors

INSERT TABLE 1 ABOUT HERE

of behavioral competences are the Set Test (F (1, 32) = 8.07, $p < .01$), the mean scores on the two Piagetian tasks (both of which individually accounted for significant amounts of variance: F (1, 32) = 8.07, $p < .01$ and F (1, 32) = 9.50, $p < .01$ for the Pendulum and Balance tasks, respectively) and, to a lesser extent, the WAIS Vocabulary subtest (F (1, 32) = 2.25, $p > .05$). None of the other predictor variables accounted for significant amounts of variance.

A canonical correlation analysis was performed with the 4 factors of SGRS as predicted variables and the same cognitive tasks again as predictor variables. The value of the canonical correlation was .85. The variance shared by the two linear composites formed for the predicted and predictor variables is approximately 72%. It should be noted from TABLE 2 that the greatest contributions to the correlation comes from the Piagetian tasks,

INSERT TABLE 2 ABOUT HERE

the Set Test and, to a lesser extent, the WAIS Vocabulary subtest (predictor variables), apathy and, to a lesser extent, physical disability (predicted variables). The predictor variables found to be the more accurate predictors of variance in SGRS in fact account for appreciable variance only on two specific factors, namely, apathy and physical disability.

DISCUSSION

The present results provide evidence for a strong relationship between behavioral and cognitive competences in the institutionalized elderly. The variance in common between the predicted and predictor variables was in the region of 70%, from both the multiple regression and canonical correlation analyses. The direction of any causal trend cannot be determined from the present study, but plausible speculation can be offered for either alternative.

It is of interest that from the array of cognitive tasks, the more accurate predictors of behavioral competences were the Piagetian tasks, the Set Test and, to a lesser extent, the WAIS Vocabulary subtest. With regard to Horn and Cattell's (1966) formulation, Piagetian tasks would be categorized as relevant to fluid intelligence, vocabulary as relevant to crystallized intelligence, whereas the Set Test occupies an indeterminate status (Schaie & Strothers, 1968). Performance on both Piagetian tasks (Papalia et al., 1972) and word fluency tasks (Isaacs & Akhtar, 1972; Schaie & Strothers, 1968) tend to decline with age, whereas vocabulary performance remains relatively constant (Heron & Chown, 1967). Consequently, it is not possible to classify the more highly predictive tasks in a simple manner. The associate-learning task and digit span both measure aspects of short-term acquisition and neither was able to account for appreciable variance in the SGRS.

Of the four factors of the SGRS, that predicted to the highest extent by the cognitive array was apathy. The physical disability factor was predicted to a lesser extent and the remaining two factors to a minimal extent. This latter was not entirely unexpected, owing to the relatively low reliabilities

associated with the communication failure and socially irritating behavior factors.

In conclusion, it must be stressed that the strong relationship between apathy and cognitive abilities was obtained from an institutionalized sample. A valuable question for future research concerns whether such a relationship pertains only to the institutional setting or applies generally across the aged population.

SUMMARY

The questions under consideration concern quantitative and qualitative aspects of the relationship between cognitive abilities and behavioral competences in the institutionalized elderly. Cognitive abilities were assessed by an array of five measures, namely, two Piagetian tasks, Set Test, WAIS Vocabulary and Digit Span subtests and the WMS Associate Learning subtest. Behavioral competences were assessed by the Stockton Geriatric Rating Scale (SGRS).

The overall variance in common between the two sets of variables defined by multiple regression analysis was approximately 70 percent. Of the cognitive tasks, those most highly predictive of behavioral competences were the Piagetian tasks, Set Test and, to a lesser extent, WAIS Vocabulary subtest. A canonical correlation analysis clearly indicated that of the four SGRS factors, that predicted to the greatest extent was apathy and physical disability to a lesser extent.

The difficulty in the classification of the three more accurate predictors according to Horn and Cattell's (1966) formulation of fluid and

crystallized intelligence was discussed as well as the strong relationship between apathy and cognitive abilities in the institutionalized elderly.

associated with the communication failure and socially irritating behavior factors.

In conclusion, it must be stressed that the strong relationship between apathy and cognitive abilities was obtained from an institutionalized sample. A valuable question for future research concerns whether such a relationship pertains only to the institutional setting or applies generally across the aged population. Although common method variance may serve as a confounding factor in the present study, it is believed that this would not preclude from concluding that some relationship does, in fact, exist between apathy and cognitive abilities with an institutionalized sample. Since there is at a minimum of 30% variance left unaccounted for, this strongly suggests that we should seriously attempt to identify other variables of the nature of an "antecdent-consequent" type so that we may not only better understand which facets of behavioral and cognitive functions, may be adversely affected with aging, but also, and most important, why such degradation in these various functions occur with some of the elderly.

SUMMARY

The questions under consideration concern quantitative and qualitative aspects of the relationship between cognitive abilities and behavioral competences in the institutionalized elderly. Cognitive abilities were assessed by an array of five measures, namely, two Piagetian tasks, Set Test, WAIS Vocabulary and Digit Span subtests and the WMS Associate Learning subtest. Behavioral competences were assessed by the Stockton Geriatric Rating Scale (SGRS).

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The difficulty in the classification of the three more accurate predictors according to Horn and Cattell's (1966) formulation of fluid and crystallized intelligence was discussed as well as the strong relationship between apathy and cognitive abilities in the institutionalized elderly.

TABLE 1. PAIRWISE CORRELATIONS AND BETA WEIGHTS OF THE PREDICTOR VARIABLES.

PREDICTOR VARIABLE	r*	BETA WEIGHT**
PIAGETIAN TASKS ($\bar{X}$)	-.73	-0.47469
VOCABULARY SUBTEST	-.31	0.24771
SET TEST	-.77	-0.48697
ASSOCIATE LEARNING SUBTEST	-.56	0.00010
DIGIT SPAN SUBTEST	-.43	-0.09688
AGE	.36	0.04243
SEX	-.29	-0.03575

* All significant ($p < .05$) with the exception of SEX.

** The only predictor variables which accounted for significant amounts of variance were the Piagetian tasks and the Set Test ($ps < .01$).

TABLE 2. CANONICAL CORRELATIONS COEFFICIENTS ON 4 FACTORS OF SGRS AND 7 PREDICTOR VARIABLES.

PREDICTED VARIABLES	COEFFICIENTS	PREDICTOR VARIABLES	COEFFICIENTS
AP	0.79126	PIAGETIAN TASKS ($\bar{X}$)	-0.62903
PD	0.17546	SET TEST	-0.52358
SIB	0.09999	VOCABULARY SUBTEST	0.32500
CF	0.02860	ASSOC. LRNG. SUBTEST	-0.00542
		DIGIT SPAN SUBTEST	-0.08934
		AGE	0.08240
		SEX	-0.04165

FOOTNOTES

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